

Integrated Water Quality and Aquatic Communities Protocol – Wadeable Streams

Appendix M: Equipment List

Draft Version 1.0

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This appendix contains the full list of equipment, quantities, and facilities needed for implementing the protocol, organized by material needed for each SOP.

General

- Large capacity backpacks
- Chest waders with lugged soles (no felt bottom)
- Inflatable life vests
- Safety whistles
- Field vests
- Rain gear
- Hiking Boots
- Tec-nu Poison Oak cleaner
- Patch kit for waders
- Sunscreen
- Insect repellent
- Dry clothes
- Radio, emergency procedures
- Cell phone
- Park, state, and federal permits, as required
- Multi-tool, general purpose
- First Aid kit
- Water bottles for drinking
- Water filter
- Binoculars (optional)

SOP #1. Preparations, Equipment, and Safety

1. Preparing Dataforms

- Access to KLMN Network Server
- Laser Printer

- Weather-resistant copy paper (e.g., Rite-in-the-Rain or similar) (250 sheets)
- 2. Preparing Database**
 - Trimble Yuma Tablet PC
 - Tablet PC battery charger
 - Screen protectors
 - Stylus
 - Access to KLMN Network Server
- 3. Acid Washing Bottles**
 - Fume hood
 - Protective eyewear
 - Protective gloves
 - Protective lab coat
 - Eyewash/body shower safety station
 - Baking Soda (2 or more lbs)
 - Concentrated HCl (~2 liters)
 - Access to distilled water
 - 1000 ml graduated cylinder
 - Large funnel
 - Shallow trays
 - pH meter
 - Glass stirring rod
 - 250 ml Amber HDPE collection vials (75)
 - 2 L Amber HDPE collection vials
 - 60 ml Amber Boston Rounds
- 4. Filters for Dissolved Organic Carbon**
 - Muffle furnace
 - Aluminum foil
 - Whatman GF/F filters (product no. 1825-047) (75)
 - Sealable plastic baggie for storage
 - Permanent marker for labeling baggie
- 5. Filters for filtered water samples**
 - Drying oven
 - Deionized water
 - Whatman GF/C filters (product no. 1822-047) (75)
 - Acid washed tub for soaking
- 6. Preparing Dissolved Organic Carbon bottles**
 - Muffle furnace
 - High-temperature gloves
 - Large tongs for moving bottles in and out of furnace
- 7. Preparing Electronic Equipment**
 - GPS unit
 - List of sites for the sampling period, with coordinates
 - Accessory cords for connecting to computers
 - Digital camera
 - Memory card (>2 gigabytes)
 - Laptop

- Carrying case for laptop
- Power cord for laptop
- Laptop peripherals (keyboard, mouse)
- Eureka Environmental *Amphibian* pocket PC
- Computer connection cord for *Amphibian*
- Battery charger for *Amphibian*
- Access to the KLMN server

SOP #4. Data Entry

1. Computer Entry

- Trimble Yuma Tablet PC, charged batteries
- Carrying case
- Stylus
- Screen protectors

2. Backup Paper Datasheet Entry

- Clipboard
- Pencils, mechanical preferred
- Complete set of data forms on weather resistant paper
 - Stream Verification forms
 - Sample Collection form
 - Field Chemistry and Channel Constraint form
 - Torrent Evidence Assessment form
 - Stream Habitat Characterization form (minimum of 15)
 - Vertebrate Sampling form
 - Slope Data form
 - Dominant Tree and Invasive Species forms
 - Large Woody Debris forms
 - Stream Discharge form
 - Photo Logbook form
 - Event form
 - Calibration form

SOP #6. Site Arrival Tasks and Sample Reach Layout

1. Locating the Sample Reach

- Topo Maps
- GPS Unit (with coordinates loaded)
- Compass
- Park Atlas

2. Prepare and Pre-label Sample Vials

- Electronic labeler
- 1 inch wide label tape
- Spare batteries for labeler
- 250 ml Amber HDPE collection bottle (acid washed)
- 60 ml Amber Boston round collection bottle
- 500 ml or larger macroinvertebrate collection bottle (minimum of 4)
- 60 ml LDPE Scintillation vials (2)

- Premade internal macroinvertebrate labels (minimum of 4)
- Pencil
- Vinyl tape
- Permanent marker

3. Setup Stream Transects

- 50 m Transect tape
- Surveyors flagging stakes
- Permanent marker

SOP #7. Water Quality Multiprobe Calibration and Field Measurement

1. Calibration and Measurement

- Eureka Environmental *Manta* Multiprobe
- Eureka Environmental *Amphibian* Pocket PC
- Calibration cup and cap
- Weighted measurement cup
- Battery charger for *Amphibian*
- Calibration solutions
 - Conductivity
 - pH
 - Turbidity
 - ORP
- Extra Dissolved Oxygen membranes
- Dissolved Oxygen replacement electrolyte
- pH reference solution
- Toothbrush for cleaning probe

SOP #8. Water Chemistry Sample Collection and Processing

1. Collection

- 2 liter Acid washed Amber HDPE collection vial

2. Processing

- Clean field cloth for workspace
- Filter forceps
- Inline filter holder, with all fittings and O-rings
- 60 ml Leur-lok syringe
- Whatman GF/C filter, pre-rinsed in deionized water
- Whatman GF/F filter, combusted
- 250 ml Amber HDPE collection vial (2)
- 60 ml Amber Boston Round Collection vial
- Cooler pouch
- Frozen ice pack
- Latex gloves

3. Acid Neutralizing Capacity

- Hach Alkalinity Kit
 - 0.16 and 1.6 N H₂SO₄ cartridges
 - Digital titrator
 - Erlenmeyer flask

- Graduated Cylinder
- Bromcresol Green – Methyl Red powder pillows (3 minimum)
- Phenolphthalein Indicator powder pillows (3 minimum)
- Protective eyewear
- Latex gloves

SOP #9. Macroinvertebrate Collection

1. Collection and Processing

- D-frame net, 1 ft wide, 500 μ m mesh
- 5 gal buckets (2)
- 500 μ m sieve
- 95% Ethanol (2 L minimum)
- 500 ml or larger collection vials (4 minimum)
- Paper labels
- Pencil

SOP #10. Discharge Measurement

1. Measurement

- Flowtracker ADV module
- Staff (bottom and top)
- Batteries (8 AA)
- Thumb screw for attaching probe to staff (and spare)
- Philips head screwdriver for replacing batteries
- Mounting bracket for securing module to staff (optional)

SOP #11. Periphyton Collection

1. Collection

- Funnel
- 12 cm² area delimiter (3.8 cm diameter pipe)
- Stiff bristle toothbrush
- 1 L wash bottle (stream water)
- 1 L wash bottle (distilled water)
- 60 ml plastic syringe
- 60 ml scintillation vials (2)
- 0.45 μ m, 47 mm diameter mixed cellulose filter, HAWP 047-00 manufacturer number
- Filter holder
- Filter forceps
- Aluminum foil

SOP #12. Stream Habitat Characterization

1. Substrate Cross-sectional Characterization

- Clinometer
- Meter stick or Biltmore stick
- Convex canopy densiometer
- 50 m Transect tape

SOP #13. Measuring Slope

1. Measurement

- Abney level
- Stadia rod, oval, 5 m tall, metric

SOP #14. Riparian, Invasive Plant, and Dominant Tree Characterization

- Tru-Pulse Laser Rangefinder 200B
- Invasive Plant identification cards

SOP #15. Aquatic Vertebrate Sampling

1. Collection

- Smith-Root LR-24 backpack electrofisher
- 6 ft. 2-piece electrode pole
- 11 inch electrode ring
- “Rat-tail” cathode
- Battery (24 V, 7Ah) and spare, charged
- Battery Charger
- Shock proof collection nets (2)
- 5 gallon bucket (2)
- Battery powered aerators
- Spare batteries for aerators
- Rubber, insulated gloves for electrofishing
- Permits

2. Processing and vouchering

- Fish boards
- Taxonomic guides to fish and amphibians
- Aquarium nets
- 2 L plastic collection vials for vouchers
- Weather resistant paper for voucher labels
- 10% buffered formalin for vouchers
- Camera

SOP #16. Photo Points and Photo Management

- Digital camera
- Camera memory card
- Photos of all transects from previous sampling years
- Photo logbook or Tablet PC with data form

SOP #17. Post-site Tasks

1. Disinfection

- Spartan Metaquat Germicidal disinfectant
- 13 gal trashcans (4)
- Protective gloves
- Bleach
- Scrub brush

2. Sample storage

- Freezer (-20 °C)
- Refrigerator (4 °C)
- Storage bins

3. Sample shipping

- Ice chests
- Chain of custody forms
- Reusable ice packs
- Vinyl tape
- Packaging tape
- Bubble wrap or other
- Garbage bags for lining coolers
- Pre-paid shipping labels
- Large zipper-type sealable plastic bags
- Weather resistant paper with sample inventory

4. Data Backup

- Laptop computer
- Power supply (either ample battery power, or wall sockets)
- Connection cables or card readers (camera, *Amphibian*, Tablet PC, GPS units)

5. Miscellaneous

- Battery chargers (Tablet PCs, rechargeable batteries, GPS units, *Amphibian*, cameras, etc.)
- Inverter for charging from vehicles if crew is camping out